REMARKS

Applicants gratefully acknowledge that the Examiner has found claims 10-13, 23-26, and 31-35 to be patentable and allowed them.

Claims 3, 4, 8, 15-17, 21 and 28-30 are objected to, but indicated allowable if rewritten in independent form. The foregoing amendments in claims 3, 8, 15, 21, 28 and 29 rewrite these claims to include the limitations of the claims from which they depend. Therefore, all of the objected to claims, these amended claims and the claims dependent from them, are deemed to be allowable over the art of record.

The foregoing amendments in claims 1, 14 and 27 are intended to define the invention more clearly to overcome the rejection of claims 1, 2, 5, 14, 18 and 27 as obvious over certain prior art.

The subject matter amendments to claims 1, 14 and 27 are supported in the specification at page 12, line 21 to page 12, line 25.

The present invention provides a method for processing digital image data to control blurring of a digital image by sharpening the image. The process takes signal image data for each pixel, whether a gray scale value or values for red, green and blue chrominance signals, and processes that data. The process uses a function that defines a distribution of the image data obtained from the pixel-by-pixel image data. The process takes the value of a Laplacian (second order differential) of the distribution function, and subtracts it from the associated pixel value of the original image.

The invention uses a first parameter k that weighs (increases or decreases) the value of the second order differential so derived. The invention includes the use of set limit parameters θ,λ to control the amplification of noise and overshoot/undershoot, respectively, of the sharpening process. The Lapacian function of the present invention determines set values for the parameters k, θ, and λ by comparing the difference in the pixel values of a target pixel to the pixel values of adjacent pixels.

Applicant respectfully traverses the rejection of claims 1, 5, 14, 18 and 27 under 35 USC 103 as obvious in view of the newly cited Jain article, as well as the rejection under 35 USC 103 of claims 2, 6, 7, 9, 19, 20 and 22 in view of the Jain article when combined with the Chan '447 patent.

According to the present invention recited in claims 1, 14, and 27 as amended, the first parameter (k) for determining the size of the second-order differential is adjusted (altered) <u>according to image data subjected to the sharpening process</u>. As a result, it is possible to adjust the degree of edge-emphasis for each image subjected to the sharpening process.

The first parameter of the present invention is adjustable by the operator according to the original image subjected to the sharpening process. In contrast, λ in Jain 'Fundamentals of Digital Image Processing", 1989 (hereinafter Jain) is constant and cannot be adjusted according to the image subjected to the unsharpening process as in other known sharpening process.

In Jain, the condition of $\lambda > 0$ merely implies that λ can be selected from the range of $\lambda > 0$; it does not imply that λ can be adjusted according to each image subjected to the sharpening process.

Jain neither discloses nor suggests the essential feature of the present invention of altering <u>according to image data subjected to the sharpening process</u>, the first parameter for determining the size of the second-order differential to be subtracted from the image data of the original image. This limitation now appears expressly in claims 1, 14 and 27.

The Examiner alleges that the Chan U.S. patent No. 6,665,447 (hereinafter Chan) discloses in columns 4 and 5, the structure in which data that is representative of the characteristic of the image data is extracted from the inputted image data, and the gain is set by inputting this data to a predetermined algorithm, and denies the non-obviousness of the invention as recited in claim 2.

However, according to the disclosure of the Chan patent (column 5, lines 29 to 31), the gain is set to a value according to the degree of the sharpening as required, or to an appropriate value based on experiments. It is therefore apparent that in Chan, the gain is not set based on the characteristic amount of the image data.

Chan therefore fails to disclose or suggest the characteristic structure of the present invention as recited in dependent claim 2, i.e., "data that is representative of the characteristic of the image data is extracted from the inputted image data, and the first parameter is set by inputting this data to a predetermined algorithm".

Chan discloses the structure where, in the algorithm for sharpening, each of the differences in value between a target pixel and a plurality of pixels in the vicinity thereof is multiplied by a parameter (Gain) (see columns 4 and 5). Based on this disclosure, the Examiner argues that Chan teaches the Gain which is altered according to each difference in value, and rejects independent claims 6 and 19.

However, in Chan this Gain is set according to the degree of the sharpening process, or set based on experiments, and is NOT altered according to each difference in value (see column 5, lines 29 to 35).

We therefore believe that Chan fails to disclose or suggest the characteristic structure of the present invention as recited in independent claims 6 and 19, that each coefficient is varied depending on the size of the corresponding difference. To combine Chan and Jain for these rejections is mere hindsight.

Applicants note that the Examiner has not considered the Jackson et al. article "Chest Radiograph Enhancement..." document CF in the IDS filed on March 29, 2004 (copy enclosed). Also enclosed is the postcard receipt for this filing which lists not only the IDS, but also the cited references. Applicant therefore believes that this reference was properly before the Examiner. However, applicants are again submitting a copy of the cited article.

Applicants urge that given the foregoing amendments and remarks, the pending claims are definite, and they define novel, patentable subject matter over the art of record. This application is therefore believed to be in condition for allowance.

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Respectfully submitted,

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